Proposal to verify the Jarzynski equality in a simulated open quantum system JING-NING ZHANG, KIHWAN KIM, Center for Quantum Information, Institute for Interdisciplinary Information Sciences, Tsinghua University — We propose an experimental scheme to verify the Jarzynski equality in a simulated open quantum system. The Jarzynski equality first proposed by C. Jarzyski [1], relates the non-equilibrium work with the free energy difference, and has been therotically proved [2] for both closed and open quantum systems. There are several proposals as well as experiments concerning the verification of the Jarzynski equality in closed quantum system, while the experimental test in open quantum system still stay untouched. In our proposal, the system and environment are both simulated by simple harmonic oscillators, which can be readily implemented in a trapped ion system. We also propose a feasible way to reconstruct the work and heat distributions via the corresponding characteristic functions, which can be directly measured with the help of an ancilla qubit.

[1] C. Jarzynski, Phys. Rev. Lett. **78**, 2690 (1997).
[2] Shaul Mukamel, Phys. Rev. Lett. **90**, 170604 (2003).

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